Basis of Design

Project Title: **SR 20 Sharpes Corner Vicinity - Improvements**

PIN: 102029K

Date: 6/2/2016

Basis of Design Phase
(Identify the current project phase)

Planning		Scoping		Design	X

Planning Document Summary

This project has a long history over the past decade. A Pre-Design study was completed in 2007 and presented multiple, high-cost options at Sharpes Corner. Two public meetings were held between 2007 and 2008 to present these alternatives and solicit public feedback. A VE study was conducted in 2008 and recommended a roundabout w/cut & cover tunnel along with improvements at Miller/Gibralter, Fidalgo Bay Rd and to provide a multi-use trail between Marches Point Rd and Sharpes Corner. Project was Shelved in 2009. 2012 "Fee Bill" provided funding to update collision data, growth forecast and re-evaluate roundabout configuration. Design was revised and cut/cover tunnel removed from project. Project applied for 2013 TIGER Grant which was not awarded and the project was shelved.

General Project Information

Route Information:	**SR**	**NHS (Y/N)**	**Functional Class**	**Current Posted Speed**	**Truck %**	
	20	Y	Urban-Principal Arterial	50 / 55 MPH	9.72	
Project Information:	**Begin MP**	**End MP**	**Sub-Program**	**County**	**Funding**	
	47.04	48.4	I1 Urban Mobility	Skagit	I1 - Urban Mobility	
	Current ADT	**Within City?**	**Current Listed Access**	**Current Planned Access**		
	29,981	Partially within Anacortes	Limited (east / west), Managed Class 2 (south)	No revisions planned		

Future and Related Projects:

Within the project limits, no future projects are listed in the Mount Baker Area six year plan. We are unaware of any planned by local agencies adjacent to the project. A paving project on the SR 20 Spur is planned for construction in the summer of 2017.

Important Project History or Background Information
(Optional: information that will help understand why the preferred alternative was chosen)

The SR 20/SR20 Spur intersection (locally known as Sharpes Corner) is located at MP 47.89 in western Skagit County and within the Anacortes City limits. This portion of SR 20 is a divided multi-lane highway running east-west and a two lane highway running north-south with posted speeds ranging from 50 to 55 mph. The intersection currently experiences ~31,000 vehicles per day making it the busiest intersection in Skagit County. 144 recorded collisions have occurred within the last 10 years with 56% of those being rear-end and 27% strike at angle. The intersection has been identified as an Intersection Analysis Location (IAL). Heavy volumes of left turn movements towards Oak Harbor create significant congestion, delay and result in long queueing that extends beyond available storage and out onto mainline SR 20. This condition increases the potential for high speed, rear-end and side swipe collisions.

Other locations within the general SR 20 and SR 20 Spur vicinity, the Miller/Gibralter and Fidalgo Bay Rd intersections, have been identified as areas where improvements could be made that would enhance the safety and mobility of the Sharpes Corner intersection.

Additionally the Sharpes Corner intersection currently lacks facilities for multi-modal crossing of SR 20 and users are forced to find alternate routes or use significant detours to get to a designated crossing.

This project will address safety, mobility and freight needs by constructing improvements at the Sharpes Corner intersection and evaluating the need for improvements at other locations within the general vicinity. In addition, the needs of non-motorized safety and connectivity will be evaluated and addressed.

In 2009, the city of Anacortes completed the construction of Scandia Rd. and Old Brooke Lane. This work was completed in effort to help provide traffic congestion relief while the Sharpes Corner improvements are being constructed.

Section 1) Project Needs

***Note for I-2 Safety Projects**: If a Crash Analysis Report already exists, some of the information required in this section may already be covered in the report. See the Basis of Design Instructions for more details.*

List the project's BASELINE NEED(S). Include the performance metrics that will be used to evaluate alternatives and the performance targets for those metrics.	Baseline Need information below is a brief summary of the information presented in the Need Statement document attached. Refer to the Need Statement for additional information. **SAFETY NEEDS** **SR 20/SR 20 Spur (Sharpes Corner)** The Sharpes Corner intersection is experiencing approx. 61% more total crashes and approx. 62% more fatal & injury crashes than a typical urban 3-leg signal. Performance Metrics: Reduce **ALL** crashes by 40%; Reduce **Fatal & Serious Injury** crashes by 80%. **SR20 / Miller Rd / Gibralter Rd** 50% of the crashes at this location fall in the Fatal & Serious Injury category & there were two fatalities between 2011 & 2015. Performance Metrics: Reduce the number of **Fatal & Serious Injury** crashes to 0 crashes/year.	
	MOBILITY NEEDS **SR 20/SR 20 Spur (Sharpes Corner)** The Sharpes Corner intersection currently operates at LOS D with an average delay of 35 sec/veh. In the PM Peak Hour. Performance Metrics: Improve to **LOS A** (average user delay of 10 sec/veh or better) in the PM Peak Hour. **SR20 / Miller Rd / Gibralter Rd** During the AM & PM Peak Hours, the Miller & Gibralter legs of this intersection operate at LOS D or worse. Performance Metrics: Reduce delay of side legs to 20 sec/veh or better (LOS B).	
List the project's CONTEXTUAL NEED(S). Include the performance metrics that will be used to evaluate alternatives. List performance targets for the metrics, if applicable.	**SR 20 Spur / Fidalgo Bay Rd.** 63% of all crashes were enter at angle type which accounted for 80% of all injury crashes at this location. Performance Metric: Reduce Enter at angle type crashes by 30%. **Improve connectivity for Non-Motorized users between Sharpes Corner and March's Point Road intersections.** (Performance Metric N/A) **Maintain Access Control between Sharpes Corner and Miller/Gibralter.** (Performance Metric N/A) **Accommodate "Superloads" at Sharpes Corner.** (Performance Metric N/A) **Provide Stormwater Treatment**. (Performance Metric N/A)	
Has a Contributing Factors Analysis been completed? If so, list any major findings that are useful in more specifically understanding the project need(s).	See Attached "Contributing Factors" Document See Attached "Alternative Determination History" Document	
Has a crash diagnosis (i.e. Crash Analysis Report) been completed? (Yes or No)	YES	See Attached "Crash Analysis Report"

Section 2) Context

Land Use Context (existing and future)	Existing land use in the project vicinity is a rural corridor. Land use is mostly residential homes in the vicinity, with a few small businesses at the intersection including a Motel, Gas Station, Restaurant and Flea Market. Just outside of the project zone are two refineries; Shell and Tesoro. The Industrial land use adds heavy freight and cyclic traffic to the area. Residential Density in this area is low-moderate. Much of the land in the project vicinity is Residential, but houses are on large lots and are mostly single family homes. Employment Density in the immediate area is Low. Only a few small businesses exist within the project area. Sharpes Corner and a large portion of the project is within the City of Anacortes. The City limit line is about 1000 feet south of Sharpes Corner. Large employers exist in the City of Anacortes, at the March's Point Refineries, and along the I-5 corridor, so commuter traffic is moderate in the area. Pedestrian and transit traffic modes are currently very low and not expected to grow. Few pedestrian generators exist within the project limits. A small number of cyclists travel through this intersection as commuters and a fair number pass through as recreational users. The built environment is rural in this area. No nearby buildings are taller than 2 stories and structures are set well back from the traveled way. This intersection does not have any activity centers.
Community Engagement	There are three Public Open Houses planned throughout the project. Documentation from past open houses has been used to identify contextual needs. Input from on-line forums and other sources is being monitored. A project website has been developed and will continue to be actively maintained.
Transportation Context (existing and future)	Sharpe's Corner is a key link between the I-5 Corridor, Anacortes, and Whidbey Island. For Residents of Oak Harbor, Anacortes, and the surrounding communities, this corridor represents the only way to and from their homes. Sharpe's corner is also a link in the 400 Mile Cascade Loop Scenic Byway, and is part of a Federally designated US Bike Route which begins in Anacortes. This corridor also provides access to three Washington State Ferry Docks (Anacortes, Coupeville, and Clinton). These three ferry docks accounted for a combined 28.8% of total 2014 WSF ridership with a total of 6.7 Million passengers utilizing these routes. Local connectivity of this intersection is low, intersections are very spaced out and sidewalks/ crosswalks do not currently exist at Sharpe's Corner. Speeds along this route are high, especially along the East and West legs where it is designated limited access highway. An overwhelming majority of traffic in this area is through traffic connecting between the population centers and recreational opportunities of Island County. Due to limited and managed access in the area, an increase of travel destinations within the project limits is unlikely. The priority at this intersection is cars on long trips moving between zones outside of the immediate area. This corridor is a T-2 Freight route. Truck frequency and size are high in this area. The presence of superloads generated by the local refineries and deepwater port will need to be considered during alternative selection.
Major Environmental Considerations (*See the Environmental Review Summary for Details)*	Wetlands exist along both sides of the East and West legs of Sharpe's corner including a Type IV Estuarine wetland to the SW of the intersection which would require major mitigation if affected by work. Wildlife impacts will likely be low to non-existent during construction.

Section 3) Design Controls

Selected Design Years (*and explanation for the selection)*	2037 (20 years from construction)
Design Users	Commuter, Commercial (truck), Transit (bus), Bicyclists (commuter and recreational), Pedestrians (minimal), Super Load
Modal Compatibility	As identified in the Context discussed above, the project area is used by all modes of transportation. For Automobile, Freight and Transit modes the project area is largely used as a connection to other cities, towns or highways and there are very few trip generating sources. On occasion, the refineries at March's Point have a need to pass a "superload" through the intersection and our proposed improvements will take that into account. This route is frequently used by a small group of bicycle commuters and is used on occasion by recreational cyclists. Pedestrian traffic in the area is minimal and is generally a product of the few businesses that exist near the Sharpes Corner intersection. Based on current zoning, discussions with the City of Anacortes and observed lack of growth in the project area we do not anticipate the Land Use or Transportation Context to change over the life of the project so the Modal Compatibility will be designed to match the existing context.

Modal Priorities

Mode	To be prioritized in design decisions? (Yes or No)	Rank / Priority (1,2,3, etc.)	Notes
Automobile	Yes	1	Generally commuting through the project area toward other destinations.
Transit	Yes	1	The area is used by local transit agencies. One transit stop exists within the project limits.
Freight	Yes	2	No freight generators within project limits.
Pedestrian	No	4	Possible generators exist at Sharpes Corner
Bicycle	Yes	4	We are aware of a group that commutes through the area.
Other	Yes	3	Refinery "Super load".

Intersection Design Vehicle	Sharpes Corner: WB 67 / Super Load Miller Gibralter: WB67 on SR20 and WB50 on Miller & Gibralter

Terrain Classification	Rolling
Selected Access Control *(Given the current access density and intersection spacing, is a different access selection warranted? If designing for a future context vision, what is the appropriate level of access needed?)*	SR 20 MP 48.89 to 48.40 (East Leg) and SR 20 Spur MP 47.89 to 48.40 (West Leg): Limited Access - Partial Control SR 20 MP 47.04 to 47.89 (South Leg): Managed Access - Class 2. Existing access classifications are appropriate for the current and future context.
Target Speed	All target speeds match posted speeds. Sharpes Corner: 55 mph on east and west legs. 50 mph on south Leg. Segment between Sharpes and Miller/Gibralter: 50 mph Miller Gibralter: 50 MPH on SR20, 30 MPH on Miller Road, and 35 MPH on Gibralter Road.

Section 4) Alternatives Analysis

***Note for I-2 Safety Projects**: If a Crash Analysis Report already exists, some of the information required in this section may already be covered in the report. See the Basis of Design Instructions for more details.*

		Alternative Name or Description
Alternatives Considered	**No Build**	No Build
	A	[Sharpes Corner: Signalized with two left turn lanes] [Miller Gibralter: Roundabout]
	B	[Sharpes Corner: Roundabout] [Miller Gibralter: Roundabout]
Preferred Alternative	**B**	

Attach copies or provide information (title, date, etc.) regarding alternatives analysis, trade-offs comparison, or similar exercises that have been completed for this project, such as an ALTERNATIVES COMPARISON TABLE.	See attached "Alternatives Comparison Table"

Section 5) Design Element Selection

For each design element below, identify whether or not the design element is included in the preferred alternative for each alignment or location. You can group alignments into a single location if desired. You may need to add or delete columns.

Design Element	SR 20 / SR 20 Spur (55MPH)	SR 20 (50MPH, south leg) Including Miller / Gibralter Intersection				
1. Lane		X				
2. Median / Buffer		X				
3. Shoulder		X				
4. Streetside / Roadside Zone						
5. Pedestrian Facility	X	X				
6. Bicycle Facility	X					
7. Bridges						
8. Horizontal Alignment		X				
9. Vertical Alignment						
10. Cross Slope						
11. Side Slope		X				
12. Clear Zone		X				

13. Barrier, Guardrail & Rumble Strips	X					
14. Signals, Illumination, and ITS	X	X				
15. Signing and Delineation	X	X				
16. On/Off Connections						
17. Intersection / Ramp Terminal						
18. Road Approaches		X				
19. Roundabout	X	X				
20. Access Control		X				

SR 20 / Sharpes Corner Vic. - Improvements
XL4998

Approval Signatures

REGION PROJECT ENGINEER	Date 6/3/16
REGION PLANNING MANAGER	Date 6/6/16
REGION ENGINEERING MANAGER	Date 6/3/16
HQ ASSISTANT STATE DESIGN ENGINEER	Date 7/1/16

Basis of Design Form Date: 11-17-15

Alternatives Comparison Table - SR 20 Sharpes Corner Intersection Improvements

Date:

Performance Category	Baseline Performance Metrics														Contextual Performance Metrics																								Cost
	Mobility				Safety					Safety					Access Control			Accommodate slow moving vehicles between M/G and Sharpe's			Other			Environment						Community & Stakeholder									
Mode	Auto/Transit/Freight	Auto/Transit/Freight			All	All	Freight - General			Ped	Bike	Auto	Transit - General	Freight - General	Auto	Transit - General	Freight - General	Freight - Transport	Transit - General	Freight - General	Auto	Transit - Bus	Auto							Bike	Ped	Auto								
Performance METRIC / ALTERNATIVE	Improve to LOS A (Sharpes Corner)	Reduce Delay to Side Legs by 20 sec/veh or better (Miller/Gibralter)			Reduce All Crashes by 40% (Sharpes Corner)	Reduce Fatal & Serious Injury by 80% (Sharpes Corner)	Reduce Collisions			# of Serious Injury and Fatal Crashes					Improve Aaccess control	Improve Aaccess control	Improve Aaccess control	Accommodates Superloads	Accomodates buses	Accomodates trucks	Provide Illumination	Maintain bus stops	Maintenance							Improve Connectivity	Improve Connectivity	Limit construction duration							
No Build	-	-	-	o	-	-	-			-	-	-	-	-	-	-	-	o	-	o	o	o	o				-				-	-	++						$0
A Sharpes: Signal / Two LT Miller/G: Roundabout	+	+	+	o	+	+	+			+	+	+	+	+	+	+	+	+	++	+	+	o	o				+				+	+	+						$7.7 million
B Sharpes: Roundabout Miller/G: Roundabout	++	++	++	+	++	++	++			+	+	++	++	++	++	++	++	+	++	+	+	o	+				+				+	+	o						$8.7 million

Performance Trade-Offs Discussion and Recommended Preferred Alternative

Alternative A: According to the Crash Analysis Report (CAR), this alternative provides an 11% total crash reduction, which includes 17% reduction in fatal and injury crashes. The traffic analysis resulted in level of service (LOS) C for the PM peak in the year 2014 at Sharpes Corner, compared to D for no build. LOS at Miller / Gibralter intersection is A for both alternatives, compared to F for no-build.

Alternative B. According to the Crash Analysis Report (CAR), this alternative provides a 17% total crash reduction, which includes 46% reduction in fatal and injury crashes. The traffic analysis resulted in level of service A for the PM peak in the year 2040 at Sharpes Corner, compared to D for no-build. LOS at Miller / Gibralter intersection is A for both alternatives, compared to F for no-build.

The above CAR and LOS information shows both alternatives address the baseline needs. However, alternative B does so significantly better. Especially significant is reduction of fatal / injury crashes and significantly better LOS than alternative A. Both alternatives fit within the construction budget. In light of the improvement alternative B provides in the major issues, it is the obvious and conclusive alternative.

The contextual needs are met equally beween the two alternatives, except access options are better for alternative B, and construction time will likely be somewhat less for the signal option.

Recommended alternative: B (two roundabouts, one at Sharpes Corner and one at the Miller / Gibralter Rd SR20 intersection).

Score (relative to other alternatives):

- ++ **Optimal Performance**
- \+ **Benefit**
- o **Neutral**
- \- **Impact**

Alternative Comparison Table
Form Date: 11-17-15